

Kerry Grant, Raytheon JPSS CGS Chief Scientist, Aurora CO  
 Shawn W. Miller, Raytheon JPSS CGS Chief Architect, Aurora CO  
 Michael Jamilkowski, Raytheon JPSS CGS Customer Liaison, Greenbelt MD

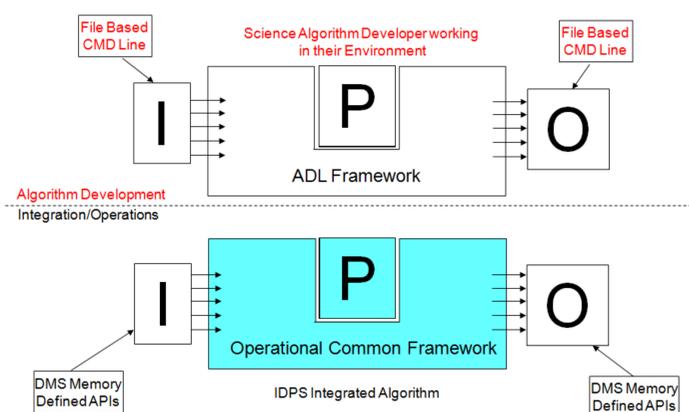
## MOTIVATION

The Environmental Data Records (EDRs) for Suomi NPP are currently undergoing an extensive Calibration and Validation (Cal/Val) campaign. As Cal/Val proceeds, changes to the science will need to migrate into the operational system. In addition, as new techniques are found to improve, supplement, or replace existing products, these changes will also require implementation into the operational system. In the past, operationalizing science algorithms and integrating them into active systems often required months of work. In order to significantly shorten the time and effort required for this activity, Raytheon has developed tools, processes, and techniques to enable rapid algorithm integration into the CGS. These include the Algorithm Development Library (ADL), the Binary Algorithm Adapter (BAA), and the Accelerated Release Cycle (ARC).

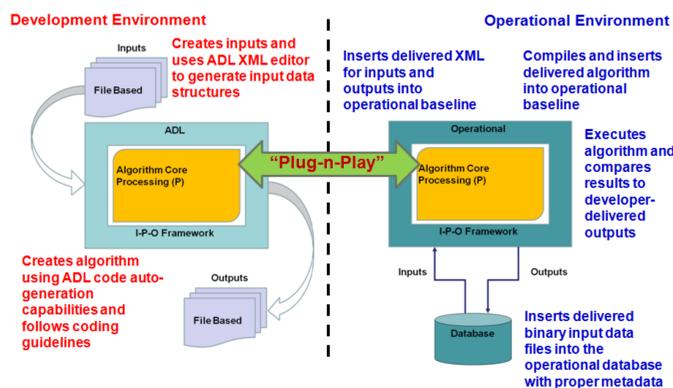
### Algorithm Development Library (ADL)

This library allows algorithm developers to easily work in their home environments, without the restrictions or learning curve imposed by interfacing directly with the operational system.

Algorithm updates are conceived, coded, and tested by scientists. Science code is provided to integrators, who “drop” the package into the new operational baseline, and complete testing



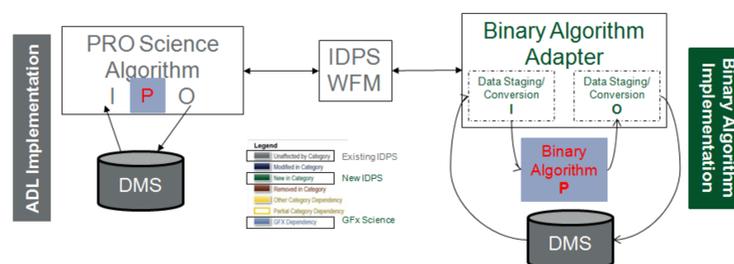
### ADL Concept of Usage



### Binary Algorithm Adaptor (BAA)

Very useful for stable algorithms, such as legacy science systems, particularly when source code is not available or easily adaptable to ADL form

An executable is provided to integrators, who use the BAA to interface with the new operational baseline



- BAA integrates IDPS with “black box” algorithms
  - Replaces “PRO Science Algorithm” with “Binary Algorithm Adapter”
- IDPS Work Flow Manager (WFM) launches the Binary Algorithm Adapter
  - Launches the Binary Algorithm and provides status back to WFM via Status Messages
  - Retrieves all required input data from DMS and stages/converts it appropriately for the Binary Algorithm
  - Converts the output back to IDP form and inserts all produced data into DMS
- Each Binary Algorithm has an IDPS Binary Algorithm Adapter

### Accelerated Release Cycle (ARC)

Eliminates dependency on semi-annual maintenance builds

ARCs are scheduled on 10 week periods, all approved algorithms that are ready at the start of an ARC are integrated into the next release

The ARC replaces standard semi-annual sustainment build cycles for all algorithm updates. Nominal 10 week cycle (includes 2 weeks of margin) replaces 26 week cycle.

Algorithm updates that are ready prior to the content cutoff date are eligible for inclusion into a given ARC. Those that are not ready simply go into the next ARC.

How was this achieved?

- Identified required enabling process modifications
- Shortened review times
- Tailored regression test to match updates
- Compacted Pre-Test Review process
- Removed kickoff meeting requirement

The use of the ADL, BAA, and ARC provides significant time and cost savings during algorithm development and implementation into an operational baseline. Initial estimates for savings compared to the cost of typical algorithm development and conversion into an operational baseline:

- Algorithm developers: 10 - 25% cost savings
- Operational conversion/implementation: ~90% cost savings

Actual experience shows savings are being realized, particularly with the operationalization activities JPSS CGS is a multi-mission ground system, so algorithms are not restricted to S-NPP or JPSS missions. ADL and BAA provide a capability that is useful to implementing algorithms for any environmental satellite mission that will plug into a JPSS CGS instantiation.